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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,859	03/15/2004	Takeo Tsukamoto	03500.015727.1	7003

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EXAMINER	
HINES, ANNE M	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 06/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/799,859	TSUKAMOTO, TAKEO	
	Examiner	Art Unit	
	Anne M. Hines	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *40-60* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *40-60* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/21/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 20, 2006 has been entered.

Claims 40-60 are pending in the instant application.

Information Disclosure Statement

The information disclosure statement submitted on April 21, 2006 has been received and is being considered.

Claims 40-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al. (US 6333598) in view of Rodriguez et al. ("Catalytic Engineering of Carbon Nanostructures," Langmuir 11, pp. 3862-3866 [1995]) (of record).

Regarding claims 40, 52, and 58 Hsu teaches a method of manufacturing an electron-emitting device, comprising the steps of: providing a substrate (Fig. 28, 12; Column 11, line 21) on which a first electrode (Fig. 28, 22; Column 14, line 31) and a second electrode (Fig. 28, 18; Column 14, line 25) are disposed; and arranging a plurality of carbon fibers on the first electrode so that a height of at least a part of the

carbon fibers from the substrate is larger than a height of the second electrode from the substrate (Fig. 28, 50; Column 14, line 45; Column 15, lines 59 to Column 16, line 4). Hsu teaches that the carbon nanotubes are formed by plasma chemical vapor deposition (Column 15, line 66 to Column 16, line 2). Hsu fails to teach wherein each carbon fiber has a plurality of graphenes. Hsu fails to teach wherein the graphenes are stacked in a direction different from a direction perpendicular with respect to an axis direction of each carbon fiber, as required by claim 40. Hsu also fails to teach wherein the graphenes are stacked along an axis direction of the carbon fiber, as required by claim 52. Hsu also fails to teach wherein the graphenes are stacked so as not to be parallel to an axis direction of each carbon fiber, as required by claim 58.

In the same field of endeavor of forming carbon nanotubes by chemical vapor deposition (CVD) (Page 3862, beginning with "Carbon nanofibers are the product of..." and ending with "...in the form of a fibrous structure"), Rodriguez teaches wherein the structure of carbon nanotubes formed by CVD include graphenes, and the graphenes are stacked in a direction that is not perpendicular to an axis direction of the carbon fiber. (Page 3864: "the graphite platelets are aligned at an angle to the fiber axis") in order to have specific electrical properties (Page 3862). Rodriguez also teaches wherein the graphenes are stacked so as not to be parallel to an axis direction of each carbon fiber (Page 3864: "the graphite platelets are stacked ... perpendicular to the fiber axis") in order to have specific electrical properties (Page 3862). Finally, Rodriguez teaches wherein the graphenes are stacked along an axis direction of the carbon fiber

(Page 3864: "the platelets are aligned in a direction parallel to the fiber axis") in order to have specific electrical properties (Page 3862).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the carbon fibers of Hsu to have a graphene structure in any of the orientations required by claims 40, 52 and 58, in order to have specific electrical properties, as disclosed by Rodriguez.

Regarding claim 46, Hsu teaches a method of manufacturing an electron-emitting device, comprising the steps of: providing a substrate (Fig. 28, 12; Column 11, line 21) on which a first electrode (Fig. 28, 22; Column 14, line 31) and a second electrode (Fig. 28, 18; Column 14, line 25) are disposed; and arranging a plurality of carbon fibers on the first electrode so that a height of at least a part of the carbon fibers from the substrate is larger than a height of the second electrode from the substrate (Fig. 28, 50; Column 14, line 45; Column 15, lines 59 to Column 16, line 4). Hsu teaches that the carbon nanotubes are formed by plasma chemical vapor deposition (Column 15, line 66 to Column 16, line 2). Hsu fails to teach wherein the graphenes are stacked in a direction that is not perpendicular to an axis direction of the carbon fiber.

In the same field of endeavor of forming carbon nanotubes by chemical vapor deposition (CVD) (Page 3862, beginning with "Carbon nanofibers are the product of..." and ending with "...in the form of a fibrous structure"), Rodriguez teaches wherein the structure of carbon nanotubes formed by CVD include graphenes, and the graphenes are stacked in a direction that is not perpendicular to an axis direction of the carbon

fiber. (Page 3864: "the graphite platelets are aligned at an angle to the fiber axis") in order to have specific electrical properties (Page 3862).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the carbon fibers of Hsu to have a graphene structure that is not perpendicular to an axis direction of the carbon fiber, as disclosed by Rodriguez, in order to have specific electrical properties.

Regarding claims 41, 47, and 53, Rodriguez further teaches wherein the providing step includes processes of: arranging a plurality of catalyst particles so as to be connected to the first electrode; and growing the plurality of carbon fibers by a reaction between the plurality of catalyst particles and a gas containing carbon (Page 3864, "carbon fibers produced from the interaction powder ... with a CO/H_2 mixture"). Motivation to combine is the same as for claims 40, 46, 52, and 58 above.

Regarding claims 42, 48, and 54, Rodriguez further teaches wherein the catalyst particles contain iron (Page 3864). Motivation to combine is the same as for claims 40, 46, 52, and 58 above.

Regarding claims 43, 49, and 55, Hsu further teaches wherein at least one or more of the carbon fibers are formed to have ends apart from a surface of the second electrode (Fig. 28, 50).

Regarding claims 44, 50, 56, and 59, Hsu further teaches wherein an electron source is manufactured having a plurality of electron-emitting devices (Column 1, lines 8-11).

Regarding claims 45, 51, 57, and 60, Hsu further teaches an image forming apparatus (Abstract) comprising a substrate having a third electrode (Column 1, lines 49-51) and a phosphor, and an electron source disposed in opposition to and spaced from the substrate (Abstract). Note that, the Examiner understands Hsu's disclosure of a field emitter display (Abstract) and an third electrode (Column 1, lines 49-51) to inherently have a phosphor located at the third electrode in order for the device to function as a display.

Response to Arguments

Applicant's arguments with respect to claim 40-60 filed on April 20, 2006 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anne M. Hines whose telephone number is (571) 272-2285. The examiner can normally be reached on Monday through Friday from 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anne M Hines
Patent Examiner
Art Unit 2879

6/23/06

KARABI GUHARAY
PRIMARY EXAMINER
6/26/06